

DANA LYNN CARPER

carperdl@ornl.gov | (530) 521-3921

CURRENT POSITION

Oak Ridge National Laboratory, Oak Ridge, TN, Aug 2021-Present
Technical Professional - High-throughput omics and data science, Bioanalytical Mass Spectrometry Group

RESEARCH INTERESTS

Symbiosis, bacterial communities, plant-microbe interactions, nutrient cycling, community assemblage, genomics, metagenomics, proteomics, metabolomics, multi-omics, synthetic communities, RNA-seq analysis, R, python, data visualization, project management

EDUCATION

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|------------|--|----------|
| PhD | University of California, Merced, Quantitative and Systems Biology
Dissertation: "Abiotic and biotic factors structuring the microbiomes of conifers in the family Pinaceae"
Advisor: Dr. A. Carolin Frank | Dec 2018 |
| MS | California State University, Sacramento, Biology
Thesis: "A Comparative study of the bacterial communities in California vernal pools"
Advisor: Dr. Enid T. Gonzalez-Orta | May 2013 |
| BS | California State University, Sacramento, Biology
Graduate Magna Cum Laude
Concentration: Molecular Biology | May 2011 |

PROFESSIONAL APPOINTMENTS

Oak Ridge National Laboratory, Oak Ridge, TN, Nov 2018-July 2021
Postdoctoral Research Associate, Plant Systems Biology Group

Beta Hatch Inc., Seattle, WA, Nov 2017-Jan 2018
Freelance Data Consultant

PUBLICATIONS

Journal Publications

Carper, D.L., Trinh, C.T., and R.J., Giannone. Proteomic Analysis of the Oleaginous Yeast *Yarrowia lipolytic*. In *Yarrowia lipolytica: Methods and Protocols*. **Accepted book chapter**

Hren, A., Lollini, N., **Carper, D.L.**, Abraham, P.E., Cameron, J.C., Fox, J.M., and C. Eckert. Highly redundant CRISPRi screens reveal intermediate, adaptation-improving transcriptional changes in cyanobacteria. **Accepted PNAS Nexus**

Allemann, M.N., Kato, R., **Carper, D.L.**, Hochanadel, L.H., Alexander, W.G., Giannone, R.J., Kamimura, N., Masai, E., and J.K. Michener. 2025 Laboratory evolution in *Novosphingobium aromaticivorans* enables rapid catabolism of a model lignin-derived aromatic dimer. *Applied and Environmental Microbiology*, doi:10.1128/aem.02081-24

Feyissa, B.A., de Becker, E.M., Salesse-Smith, C.E., Zhang, J., Yates, T.B., Xie, M., De, K., Gotarkar, D., Chen, M.S.S., Jawdy, S.S., **Carper, D.L.**, Barry, K., Schmutz, J., Weston, D.J., Abraham, P.E., Tsai, C. Morrell-Falvey, J.L., Taylor, G., Chen, J., Tuskan, G.A., Long, S.P., Burgess, S.J., and W. Muchero. 2024 An Orphan Gene BOOSTER Enhances Photosynthetic Efficiency and Plant Productivity. *Developmental Cell*, doi: 10.1016/j.devcel.2024.11.002

Davin, M.K., Thompson, R.A., Giannone, R.J., Mendelson, L.W., **Carper, D.L.**, Martin, M.Z., Martin, M.E., Engle, N.L., Tschaplinski, T.J., Brown, S.D., and R.L. Hettich. 2024 *Clostridium autoethanogenum* alters cofactor synthesis, redox metabolism, & lysine-acetylation in response to elevated H₂:CO feedstock ratios for enhancing carbon capture efficiency, *Biotechnology for Biofuels and Bioproducts*, doi: 10.1186/s13068-024-02554-w

Carper, D.L., Lawrence T.J., Quiroz, D., Kueppers, L.M. and A. C. Frank. 2024 Needle bacterial community structure across the species range of limber pine, *ISME Communications*, doi: 10.1093/ismeco/ycae062

Grossman, A.S., Gell, D.A., Wu, D.G., **Carper, D.L.**, Hettich, R.L., and H. Goodrich-Blair. 2024 Bacterial hemophilin homologs and their specific type eleven secretor proteins have conserved roles in heme capture and are diversifying as a family. *J Bacteriol.* doi: 10.1128/jb.00444-23

Kertesz, V., **Carper, D.L.**, and J.F. Cahill. 2024 High-throughput mass spectrometry analysis using immediate drop-on-demand technology coupled with an open port sampling interface. *Rapid Commun Mass Spectrom.* doi:10.1002/rcm.9687

Hyden, B., **Carper, D.L.**, Abraham, P.E., Yuan, G., Yao, T., Baumgart, L., Zhang, Y., Chen, C., O'Malley, R., Chen, J., Yang, X., Hettich, R.L., Tuskan, G.A., and L.B. Smart. 2023 Functional analysis of *Salix purpurea* genes support roles for ARR17 and GATA15 as master regulators of sex determination. *Plant Direct.* doi: 10.1002/pld3.546

Carper, D.L., Appidi, M.R., Mudbhari, S., Shrestha, H.K., Hettich, R.L., and P.E. Abraham. 2022 The promises, challenges and opportunities of omics for studying the plant holobiont. *Microorganisms.* doi: 10.3390/microorganisms10102013

Piatkowski, B.T., **Carper, D.L.**, Carrell, A.A., Chen, I.A., Clum, A., Daum, C., Eloë-Fradrosh, E.A., Foster, B., Gilber, D., Granath, G., Huntemann, M., Jawdy, S.S., Klarenberk, I.J., Kostka, J.E., Kyrpides, N.C., Lawrence, T.J., Mukherjee, S., Nilsson, M.B., Planaiappan, K., Peltier, D.A., Pennacchio, C., Reddy, T.B.K., Roux, S. Shaw, J.A., Warshan, D., Živković, T., and D.J. Weston. 2022 Draft metagenome sequences of the *Sphagnum* (peat moss) microbiome from ambient and warmed environments across Europe. *Microbiol Resour Announc*. doi: 10.1128/mra.00400-22

Appidi, M.R., Bible, A.N., **Carper, D.L.**, Jawdy, S.S., Giannone, R.J., Hettich, R.L., Morell-Falvey, J., and P.E. Abraham. 2022 Development of an experimental approach to achieve spatially resolved plant root-associated metaproteomics using an agar-plate system. *Molecular Plant-Microbe Interactions*. doi: 10.1094/MPMI-01-22-0011-TA

Carrell, A.A., Lawrence, T.J., Cabugao, K.M., **Carper, D.L.**, Pelletier, D.A., Lee, J.H., Jawdy, S.S., Grimwood, J., Schmutz, J., Hanson, P.J., Shaw, A.J., and D.J. Weston. 2022 Habitat-adapted microbial communities mediate *Sphagnum* peatmoss resilience to warming. *New Phytol*. doi:10.1111/nph.18072

Carrell, A.A., Velockovic, D., Lawrence, T.J., Bowen, B., Louie, K.B., **Carper, D.L.**, Mitchell, H.D., Orr, G., Markillie, L.M., Jawdy, S.S., Grimwood, J., Shaw, J.A., Schumtz, J., Northen, T.R., Anderton, C.R., Pelletier, D.A., and D.J. Weston. 2021 Novel metabolic interactions and environmental conditions mediate the boreal peatmoss-cyanobacteria mutualism. *ISME* doi: 10.1038/s41396-021-01136-0

Shrestha, H.K., Appidi, M.R., Solis, M.I.V, Wang, J., **Carper, D.L.**, Burdick, L.H., Pelletier, D.A., Doktycz, M.J., Hettich, R.L., and P.E. Abraham. 2021 Metaproteomics reveal insights into microbial structure, interaction, and dynamic regulation in assembling synthetic communities as they respond to environmental disturbance. *BMC Microbiology* doi: 10.1186/s12866-021-02370-4

Carper, D.L., Weston, D.J., Barde, A., Timm, C.M., Lu, T., Burdick, L.H., Jawdy, S.S., Klingeman, D.M., Robeson II, M.S., Veach, A.M., Cregger, M.A., Kalluri, U.C., Schadt, C.W., Podar, M., Doktycz, M.J., and D.A. Pelletier. 2021 Cultivating the Bacterial Microbiota of *Populus* Roots. *mSystems*. doi: 10.1128/mSystems.01306-20

Wang, J., **Carper, D.L.**, Burdick, L.H., Shrestha, H., Appidi, M., Abraham, P.E., Timm, C.M., Hettich, R.L., Pelletier, D.A., and M.J. Doktycz. 2021 Formation and characterization of emergent microbial communities. *Computational and Structural Biotechnology Journal*. doi:10.1016/j.csbj.2021.03.034

Cregger, M.A., **Carper, D.L.**, Christel, S., Doktycz, M.J., Labbé, J., Michener, J., Morrell-Falvey, J., Muchero, W., Pelletier, D.A., Retterer, S., Tschaplinski, T.J., Tuskan, G.A., Weston, D.J. and C.W. Schadt. 2021 Plant-microbe interactions: from

genes to ecosystems using *Populus* as a model system. *Phytobiomes* doi: 10.1094/PBIOMES-01-20-0009-FI

Lawrence, T.J., **Carper, D.L.**, Spangler, M.K., Carrell, A.A., Rush, T.A., Minter, S.J., Weston, D.J., and J.L. Labbé. 2020 amPEPpy 1.0: Portable and accurate antimicrobial peptide prediction tool. *Bioinformatics* doi: 10.1093/bioinformatics/btaa917

Carper, D.L., Schadt, C.W., Burdick, L.H., Kalluri, U.C., and D.A. Pelletier. 2020 Draft genome sequence of *Tumebacillus* sp. Strain BK434, isolated from the roots of eastern cottonwood. *Microbiol Resour Announc* 9:1–2. doi: 10.1128/MRA.00351-20

Carper, D.L., Lawrence, T.J., Carrell, A.A., Pelletier, D.A. and D.J. Weston. 2020. DISCo-microbe: Design of an identifiable synthetic community of microbes. *PeerJ*. 8:e8534. doi:10.7717/peerj.8534

Carper, D.L., Carrell, A.A., Keuppers, L.M. and A. C. Frank, 2018. Bacterial endophyte communities in *Pinus flexilis* are structured by host age, tissue type and environmental factors. *Plant and Soil*. 428:335–352. doi: 10.1007/s11104-018-3682-x

Carrell A.A., **Carper, D.L.**, and A.C. Frank, 2016. Subalpine conifers in different geographic locations host similar foliar bacterial endophyte communities. *FEMS Microbiology Ecology*, 92(8):fiw124. doi: 10.1093/femsec/fiw124

Moyes, A.B., Kueppers, L.M., Pett-Ridge, J., **Carper, D.L.**, Vandehey, N., O’Neil, J., and A.C. Frank, 2016. Evidence for foliar endophytic nitrogen-fixation in a widely distributed subalpine conifer. *New Phytologist*. 210:657-668. doi: 10.1111/nph.13850

Lawrence, T.J., Kauffman, K.T., Amrine, K.C.H., **Carper, D.L.**, Lee, R.S., Becich, P.J., Canales, C.J., and D.H. Ardell, 2015. FAST: FAST Analysis of Sequences Toolbox. *Frontiers in Genetics*. 6:172. doi: 10.3389/fgene.2015.00172

Journal Publications (In progress)

Feyissa, B.A., Lee, J., **Carper, D.L.**, Barry, K., Engle, N., Tschaplinski, T.J., Abraham, P.E., Weston, D.J., Muchero, W., Difazio, S., Tuskan, G.A., and J. Chen. Species-Specific Epigenetic Signature Associate with Heat Stress Tolerance in a Perennial Tree Species *Populus*. **Submitted GCB Bioenergy**

Appidi, M.R., Mudbhari, S., Cope, K., Jawdy, S.S., **Carper, D.L.**, Ösküz, E., Wang, X., Tschaplinski, T., Wang, M., Hettich, R.L., Kalluri, U., and P.E. Abraham. Dynamic rhizodeposition in the woody perennial *Populus trichocarpa*. **Submitted Nature Communications**

Yao, T., Shu, M., Qiao, Z., Ployet, R., Shrestha, H.K., Feyissa, B., Engle, N.L., Zhang, X., **Carper, D.L.**, Webb, A.B., Jawdy, S.S., Rottmann, W.H., Winkler, K.A.,

Barry, K., Schmutz, J., Yang, X., Rush, T.A., Li, M., Morrell-Falvey, J.L., Abraham, P.E., Muchero, W., Tschaplinski, T.J., Tuskan, G.A., and J. Chen. Engineering ectomycorrhizal colonization in the poplar poor-host of *Laccaria bicolor* with PtLecRLK. **Submitted New Phytologist**

Drufva, E.E., Cahill, J.F., Saint-Vincent, P.M.B., Williams, A.N., Bocharova, V., Capra, N., Meilleur, F., **Carper, D.L.**, Bourgerie, C., Miyazaki, K., Yonemura, M., Shiraishi, Y., Parks, J.M., Zhou, M., Dishner, I.T., Foster, J.C., Koehler, S.J., Valentino, H.R., Sedova, A., Kertesz, V., Vasileva, D.P., Hochanadel, L.H., Figg, C.A., Negoro, S., Kato, D., Chen, S.H., and J.K. Michener. Identification and characterization of substrate- and product-selective nylon hydrolases. **Submitted PNAS**

Armes, A., Schaefer, A.L., Hochanadel, L.H., Klingeman, D.M., **Carper, D.L.**, Abraham, P.E., York, L.M., Carrell, A.A., Doktycz, M.J., and D.A. Pelletier. Quorum sensing modulates microbial community structure through regulation of secondary metabolites. **Submitted mSphere**

Werner, A.Z., Giannone, R.J., Keller, M., Plavchak, C., **Carper, D.L.**, Abraham, P.E., Wilkes, R.A., Aristilde, L., Salvachúa, D., Williams, S.K.R., Hettich, R.L., and G.T. Beckham. *Pseudomonas putida* produces two distinct populations of membrane vesicles during growth on lignin. **Submitted Nature Microbiology**

Qian, L., Dishner, I.T., **Carper, D.L.**, Kertesz, V., Zolnierczuk, N.T., Thiele, N.A., Cahill, J.F., Foster, J.C., and J.K. Michener. Enzymatic synthesis of diverse oligoamide polymer precursors. **Submitted Angewandte Chemie International Edition**

Bocharova, V., Drufva, E.E., Cahill, J.F., Popov, I., Dishner, I.T., Zhou, M., Jung, G.S., Sacci, R.L., **Carper, D.L.**, Damron J.T., Keum, J.K., Gianaru, C., Chen, S.H., Foster, J.C., and J.K., Michener. Factors Modulating the Hydrolysis of Nylon-6,6 by a Nylon Hydrolase Enzyme. **Submitted Polymer Chemistry**

PRESENTATIONS AND INVITED LECTURES

Workshops

Introduction to Scientific Computing: A Crash Course

<https://tlawrence3.github.io/Introduction-to-Scientific-Computing/>

Presented by Travis J. Lawrence and **Dana L. Carper**, Sponsored by UC Merced Women in STEM, University of California Merced, Merced CA, Feb 2018

Introduction to Scientific Computing: A Crash Course

<https://tlawrence3.github.io/Introduction-to-Scientific-Computing/>

Presented by Travis J. Lawrence and **Dana L. Carper**, BOTANY 2017, Fort Worth TX, Jun 2017

Presentations

Poster Presentation, *A metaproteome assessment of microbiome changes following microbial invasion*, 72th ASMS Conference on Mass Spectrometry and Allied Topics, Anaheim CA, June 2024

Poster Presentation, *Metagenome, metatranscriptome, and metaproteome analysis of anaerobic microbiomes digesting senescent switchgrass across a gradient of pH, temperature, and retention times*, CBI Annual Meeting, Asheville NC, June 2023

Poster Presentation, *Metaproteomic evaluation of a bioinoculant establishment in a plant-agar system*, 2023 IS-MPMI Congress, Providence RI, July 2023

Poster Presentation, *Rapid absolute quantification of abundant proteins using LC-MS/MS: Rubisco as a case study*, 2023 Plant Biology, Savannah GA, June 2023

Poster Presentation, *Proteomic evaluation of a Populus species response to a microbial biofertilizer and subsequent invasion by a fungal pathogen*, 2022 Beneficial Microbes Conference, Madison WI, July 2022

Poster Presentation, *Integrated multi-omics evaluation of a Populus species response to a microbial biofertilizer and subsequent invasion by a fungal pathogen*, 70th ASMS Conference on Mass Spectrometry and Allied Topics, Minneapolis MN, June 2022

Poster Presentation, *Plant-Microbe Interfaces: Simplified community approach to investigate multiple levels of selection in a host-microbiome relationship*, Biological Systems Science Division (BSSD) Principal Investigators' Meetings of the Genomic Science Program, Virtual, February 2021

Poster Presentation, *A constructed community approach to understand bacterial community assembly in Populus*, Oak Ridge Postdoctoral Research Symposium, Virtual, July 2020

Invited Talk, *Understanding plant-microbial interactions using two model systems: Sphagnum and Populus*, Uppsala University, Uppsala, Sweden, January 2020

Contributed Talk, *A synthetic community approach to understanding the Poplar microbiome*, Ecological Society of America Annual Meeting, Louisville KY, August 2019

Contributed Talk, *A synthetic community approach to understanding the Poplar microbiome*, BOTANY 2019, Tucson AZ, July 2019

Contributed Talk, *A synthetic community approach to understanding the Poplar microbiome*, Rhizosphere5, Saskatoon, Canada, July 2019

Invited Talk, *Variations in the foliar microbial communities in Pinus flexilis (limber pine) across its native range*, Ecological Society of America Annual Meeting, New Orleans LA, Aug 2018

Invited Talk, *Bacterial endophyte communities in Pinus flexilis are structured by host age, tissue type and environmental factors*, QSB Annual Retreat, Host-Microbe Interaction Session, University of California, Merced, Merced CA, Apr 2018

Invited Talk, *Bacterial endophyte communities in Pinus flexilis are structured by host age, tissue type and environmental factors*, Ecological and Environmental Issues Undergraduate Seminar, California State University Sacramento, Sacramento CA, Nov 2017

Contributed Talk, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, BOTANY 2017, Fort Worth TX, Jun 2017

Invited Talk, *Community Genomic: Applications in Endophytic Bacteria*, Topics in Environmental Systems: Ecological Genetics Graduate Course, University of California, Merced, Merced CA, Dec 2016

Poster Presentation, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, Botany, Savannah GA, Aug 2016

Poster Presentation, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, XVII Congress of the International Society for Molecular Plant-Microbe Interactions, Portland OR, July 2016

Contributed Talk, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, 6th Annual Symbiosis Workshop, Yosemite CA, May 2016

Poster Presentation, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, Joint Genome Institute Plant Microbe Interaction Symposium, Walnut Creek, CA, Apr 2016

Poster Presentation, *The effect of climate change and site on the above- and belowground bacterial communities in subalpine conifer seedlings*, Northern California Botanists Symposium, Chico CA, Jan 2016

Contributed Talk, *The bacterial endophytic communities associated with seedlings of high elevation pines*, 5th Annual Symbiosis Workshop, Yosemite CA, May 2015

Poster Presentation, *Bacterial endophytes within the needle and bud tissues of lodgepole pine (Pinus contorta ssp. Muryanna)*, 5th ASM Conference on Beneficial Microbes, Washington D.C, Sep 2014

Poster Presentation, *Endophytic bacterial communities in the aboveground tissue of subalpine conifers are conserved across host species and sites*, Ecological Society of America Annual Meeting, Sacramento CA, Aug 2014

Poster Presentation, *Endophytic bacterial communities in the aboveground tissue of limber and lodgepole Pine (Pinus flexilis and Pinus contorta)*, 1st annual UC Merced QSB Beautiful Systems Retreat, Midpines CA, May 2014

Poster Presentation, *Endophytic bacterial communities in the aboveground tissue of limber and lodgepole Pine (Pinus flexilis and Pinus contorta)*, 4th Annual Symbiosis Workshop, Yosemite CA, May 2014

Poster Presentation, *A comparative study of the bacterial communities in California vernal pool* California State University Program for Education and Research in Biotechnology Symposium, Anaheim CA, Jan 2013

Poster Presentation, *Bacterial diversity in California vernal pools*, California State University Program for Education and Research in Biotechnology Symposium, Orange County CA, Jan 2011

HONORS AND AWARDS

UC Merced QSB Graduate Student Travel Grant, \$800

2017

UC Merced QSB Summer Fellowship, \$6000	2017
UC Merced QSB Summer Fellowship, \$6000	2016
Northern California Botanists Symposium Student Travel Grant, \$100	2016
UC Merced QSB Graduate Student Travel Grant, \$800	2014
Valentine Eastern Sierra Reserve Graduate Research Grant, \$300	2014
CSUS, Delisile Funding for Graduate Research, \$200	2012
CSUS, Delisile Funding for Undergraduate Research, \$200	2010

TEACHING EXPERIENCE

University of California, Merced, Merced, CA Teaching Assistant , Biology	2013 to 2018
<ul style="list-style-type: none"> Taught discussion sections for genetics and genome biology 	
California State University, Sacramento, Sacramento, CA Teaching Assistant , Biology	2012 to 2013
<ul style="list-style-type: none"> Taught laboratory sections of introduction to molecular biology and a biology laboratory for non-majors 	
California State University, Sacramento, Sacramento, CA Undergraduate Teaching Assistant , Biology	2010
<ul style="list-style-type: none"> Assisted in teaching microbiology laboratory 	

PROFESSIONAL SERVICE

Biosciences Division Technical Professional Representative

Oak Ridge National Laboratory, Dec 2023-Present

Outreach Committee Lead

Women in Science and Engineering (WISE), 2022-2023

Oak Ridge National Laboratory

Contributed Oral Session Co-Organizer

Ecological Society of America General Meeting, 2018

Session: Plant microbiomes in a changing world

Student Representative

Quantitative and Systems Biology Admissions Committee, 2017

University of California, Merced

Mentor to Undergraduates

Women in STEM Club, 2017-2018

University of California, Merced

Peer-Reviewed Articles for:

- PLoS One
- Frontiers in Biology
- Scientific Reports

COMMUNITY SERVICE

Science Fair Judge, DaVinci Art & Science Fair, Oak Ridge TN, Apr 2019

Scientist Participant, 21st Annual San Joaquin County Office of Education Dinner with a Scientist, Stockton CA, Nov 2017

Scientist Participant, 11th Annual Dinner with a Scientist, Merced CA, Apr 2017

Lab Tour Guide, University of California Merced Center for Educational Partnerships 8th Grade Lab Tours, Merced, CA, Mar 2017

Science Fair Judge, 59th Annual San Joaquin County Office of Education Science and Engineering Fair, Stockton CA, Feb 2017

Scientist Participant, 20st Annual San Joaquin County Office of Education Dinner with a Scientist, Stockton CA, Nov 2016

Scientist Participant, 10th Annual Dinner with a Scientist, Merced CA, Mar 2016

Science Fair Judge, 58th Annual San Joaquin County Office of Education Science and Engineering Fair, Stockton CA, Feb 2016

COMPUTER SKILLS

Programming: python, R, bash

Applications: Microsoft office suite, ImageJ, Mac Graphics

Analysis: Amplicon DNA, Metagenomes, RNA-Seq, proteomics

SCIENTIFIC SOCIETY MEMBERSHIP

American Society of Microbiology

American Society for Mass Spectrometry

Ecological Society of America

International Society for Molecular Plant-Microbe Interactions